K415u2me
1908/09

Not to be taken
DEAN'S OFFICE,
Room 301 Eng. Hall.

BULLETIN

Of the

State University of Kentucky

Series Five :: *Number Five*

AUGUST, 1908

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

College of Mechanical *and* Electrical Engineering

PUBLISHED BY
THE STATE UNIVERSITY OF KENTUCKY
LEXINGTON

Entered at the Postoffice at Lexington, Kentucky, as second class matter, under Act of Congress, July 16, 1904.

THE GRADUATES OF THE
COLLEGE OF MECHANICAL AND ELECTRICAL ENGINEERING
STATE UNIVERSITY OF KENTUCKY.

.... 1908 ....

EACH GRADUATE HAS SECURED AN ATTRACTIVE POSITION.

Walter Christian Kiesel, Carrollton, Ky. Educated for college at the Carrollton High School. **Mr. Kiesel is employed by the Chicago Telephone Company, Chicago, Illinois.**

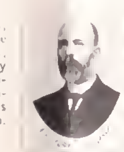
Graham King McCorkle, Eminence, Ky. Educated for college at the Eminence High School. **Mr. McCorkle is employed by the Chicago Telephone Company, Chicago, Illinois.**

Robert Lowell Samuel, Maysville, Ky. Previous education at Valparaiso University, Valparaiso, Ind. **Mr. Samuel is employed by the Tennessee Coal, Iron & Railway Company, Ensley, Alabama.**

Messrs. Kiesel, McCorkle and Samuel have for their thesis, "An Experimental Study of Telephony."

The work consisted of an exhaustive study of the latest methods of telephone engineering.

With apparatus furnished by the Western Electric Co. of Chicago, they were able to equip miniature exchanges of the magneto system and of the central energy system, including the trunking switchboard, as used in large cities.



Victor Emanuel Muncy, Cincinnati, O., B. S. State University of Kentucky, '91, M. S. '07. **Mr. Muncy has been appointed Professor of Mechanical Engineering, Ohio Mechanics Institute, Cincinnati, Ohio.**

Thesis: "The Design of An Experimental Steam and Electrical Laboratory."

This problem includes a plan for the modification and adaptation of an old structure to the necessities and conveniences of a modern laboratory, with the design of a new building of sufficient capacity to accommodate comfortably the students in electricity, in attendance at present, with such increase in numbers as may reasonably be expected during the next [illegible]

Colton Alexander Porter, Louisville, Ky. Educated for college at the Louisville Manual Training High School. **Mr. Porter has been appointed Instructor in Manual Training, Ely, Minnesota.**

Milton Sears Smith, Nicholasville, Ky. Educated for college at the Nicholasville High School. **Mr. Smith is employed by the Buffalo Forge Company, Buffalo, New York.**

Daniel Metzler, Louisville, Ky. Educated for college at the Louisville Manual Training High School. **Mr. Metzler is employed by the Kentucky Electric Company, Louisville, Kentucky.**

Thesis: "An Experimental Study of the Use of Liquid Fuel for Steam Production, Including Cost and Method of Burning."

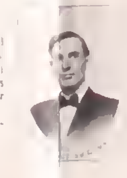
The experimental work was done at the Indian Refining Co. at Georgetown, Ky.

The Gem burner was used which sprays the oil by a jet of steam. The boiler under which the test of the oil was made was a 520 H. P. Babcock and Wilcox.

The oil was drawn from large tanks in the yard, of sufficient height to allow it to flow by gravity to the burner.

It was noted that the efficiency increased as the steam pressure increased. By taking the cost of an average coal test, a comparison can be obtained and relative value ascertained.

Proctor Knott Smiley, Catlettsburg, Ky. Educated for college at the Catlettsburg High School. **Mr. Smiley has been appointed Research Assistant in the Engineering Experiment Station, University of Illinois, Urbana, Illinois.**



Arthur Matthew Elam, Ashland, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Elam has been appointed Instructor in Mechanical Engineering, University of Illinois, Urbana, Illinois.**

Thesis: "An Experimental Study of Different Sands, Showing their Effect on Concrete, also a Test of an Ohio River Sand Digger."

In the preparation of the specimens of concrete the same mixture was used throughout, one of cement, two of sand and four of broken stone, the only variable being the grade of sand used.

The results of their experiments indicate that Ohio River washed sand is superior to any of the other sands used.

This washed sand is obtained by means of a sand digger, a boat equipped with engine driving revolving screens and centrifugal pumps.

The sand is pumped from the bottom of the river, screened, assorted and loaded in barges.

James Stewart Curtis, Lexington, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Curtis is employed by the Fairbanks, Morse Company, Beloit, Wisconsin.**

William Chamberlain Matthews, Mayslick, Ky. Educated for college at Millersburg Military Institute, Millersburg, Ky. **Mr. Matthews is employed by the Fairbanks, Morse Company, Beloit, Wisconsin.**

Thesis: "An Experimental Study of Internal Combustion Engines."

This thesis is a study of the internal combustion engine, from both the theoretical and practical standpoints.

The engines used are the Fairbanks-Morse make, one being equipped for gasoline, and the other for natural gas.

The work contemplates a series of tests, whose object is to obtain useful data for users of small power.

Theodore Becker, Louisville, Ky. Educated for college at the Louisville Manual Training High School. **Mr. Becker goes with Westinghouse Electric & Manufacturing Company, Pittsburg, Pennsylvania.**

Thesis: "The Design of a Central Lighting and Heating Station for the State University of Kentucky."

This thesis involves the design of a plant to supply power for incandescent light to all buildings located on the University campus, by means of a three wire system, due allowance being made in the design for future incandescent lamp installations.

The engine exhaust will be utilized in the vacuum or Warren Webster system of heating.

Clinton Robert Galloway, Falmouth, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Galloway has been appointed Instructor in Manual Training, Lexington, Kentucky.**

Thesis: "An Investigation of the Character of Concrete of Varying Mixture and Composition."

Mr. Galloway is endeavoring to make a comparison of specimens of concrete by first keeping the proportions constant and varying the aggregate, and second, by having a constant aggregate and varying the proportions.

The specimens were all 5 inch cubes, and were tested in a Riehle Testing Machine at an age of 18 days.

Frank Heber Graham, Bowling Green, Ky. Educated for college at Southern Normal School, Bowling Green, Ky. **Mr. Graham is employed by the Western Electric Company, Chicago, Illinois.**

Henry Lemuel Herring, Oakville, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Herring is employed by the Chicago Telephone Company, Chicago, Illinois.**

Thesis: "The Investigation of an Interurban Electric Railway System, Centering at Lexington, Ky."

The thesis work is in the nature of a test of interurban cars running out of Lexington.

Apparatus has been made by means of which continuous curves showing the motor terminal voltage, the current, and the speed of the car are traced upon a strip of paper.

From the voltage and current curves, power curves are plotted.

The speed curves are obtained from a voltmeter connected to a magneto which is belted to the car axle.

Grades, curves, stations and the general condition of the track are also [illegible]

Alphon Penrod, Paris, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Penrod is employed by the Western Electric Company, Chicago, Illinois.**

Fancis Marshall Wilkes, Washington, Ky. Educated for college at the Maysville High School, Maysville, Ky. **Mr. Wilkes is employed by the Western Electric Company, Chicago, Illinois.**

Thesis: "An Experimental Study of an Electro Dynamic Machine."

The thesis consists of the calculations, wiring and testing of a 10 H. P. machine to be run as a direct current motor, rotary converter, synchronous motor or induction motor.

James Frank Battaile, Lexington, Ky. Educated for college at Sayre Institute, Lexington, Ky. **Mr. Battaile is Manager, University Book Store, Lexington, Kentucky.**

Carter Lindsay Wilson, Louisville, Ky. Educated for college at the Louisville Manual Training High School. **Mr. Wilson is employed by the Tennessee Coal, Iron & Railway Company, Ensley, Alabama.**

Thesis: "An Experimental Study of Signal Engineering, as Applied to Block Signals."

The thesis consists first of a test of various primary cells, and then a series of tests of the Hall and Union Signals, as follows:

(1) Breakdown test of primary cells.

(2) To find downward thrust of signal rod and arm.

(3) Efficiency test.

(4) Test of clutches.

(5) Operation of signals on a single track.

(6) Overlap system on a single track.

(7) To find the minimum number of cells required to operate the signals.

Arthur Lawrence Poynter, Royse, Tex. Educated for college at the Academy of the State University of Kentucky. **Mr. Poynter is employed by the Tennessee Coal, Iron & Railway Company, Ensley, Alabama.**

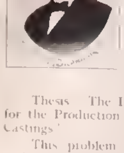
Thesis: "A Study of Lighting Oils, such as are used in Railroad Practice, with a view to establishing a National Set of Specifications."

There are two kinds of lighting oils in use at present on the Q. & C. system, a light mineral oil for long burning lights in automatic signals and a heavier compound oil, for use in cab lamps and hand lamps.

Many of the railroad specifications contain conditions regarding specific gravity, wick crustation, and chemical analysis, in addition to flashing and burning point. It is well known that mineral oils from different sections of the country, giving approximately the tests for specific gravity, flashing point, and burning point, have entirely different light giving properties. In the case of compound oils, many of them defy chemical analysis except by specially trained experts, who are seldom found outside of the employ of oil companies.

General statements regarding conditions of wick or any other phase of oil burning, have no place in specifications.

On account of limitations of time and opportunity, it will be impossible to arrive at a complete set of specifications which will cover all cases.



John Keith Browning, Maysville, Ky. Educated for college at the Maysville High Sshool. **Mr. Browning is General Manager, Maysville Foundry & Engineering Company, Maysville, Kentucky.**

Thesis: "The Design of a Modern Foundry for the Production of Medium Weight Machine Castings."

This problem includes the reconstruction and modernization of a foundry already in operation.

It considers the modern equipment of the foundry and a machine shop and provides for electrical transmission of power to all machines.

Russell Hamilton Guerrant, Wilmore, Ky. Previous education at Davidson College, North Carolina. **Mr. Guerrant is employed in Gas Engineering, Ocalla, Florida.**

John Paul Carmody, Mt. Sterling, Ky. Educated for college at the Mt. Sterling High School. **Mr. Carmody is employed by the Tennessee Coal, Iron & Railway Company, Ensley, Alabama.**

Thesis: "The Development of a Standard Series of Questions and Lantern Slides for the Murphy Method of Examining and Instructing Trainmen."

This experiment consists of making lantern slides of the interlocking and block system of signals on the Q. & C. Railroad in their different positions, and the development of a series of questions relating to their significant meaning to be used to instruct trainmen according to the Murphy Method.

Warren Thornton Green, Carrollton, Ky. Educated for college at the Sue Bennett Memorial School, London, Ky. **Mr. Green has been appointed Superintendent Jackson Electric & Hydraulic Manufacturing Company, Jackson, Kentucky.**

Robert Andrew Humphrey, Lexington, Ky. Educated for college at Johnson School, Lexington, Ky. **Mr. Humphrey goes to Cincinnati Southern Shops, Ferguson, Kentucky.**

William Perry Browning Hamilton, Lexington, Ky. Educated for college at Dudley High School, Lexington, Ky. **Mr. Hamilton has been employed by Illinois Central, Burnside, Illinois.**

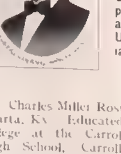
Edwin Bronston Oldham, Lexington, Ky. Educated for college at Dudley High School, Lexington, Ky. **Mr. Oldham is operating light plant, Olympia Springs, Olympia, Kentucky.**

Thesis: "A Series of Traction Tests on the Cincinnati Southern and Alabama Great Southern Roads, to Develop Locomotive Hauling Charts for these Roads."

The above discussion involves the determination of hauling co-efficients that will be used in making up the weight of freight trains between Meridian, Miss., and Cincinnati, Ohio. A series of tests from time to time has been conducted to determine the ratio of the load hauled to the tractive power of locomotives. Each division has its controlling grade and curves, and the resistance co-efficients were determined by actual hauling tests, a series of tables were developed, showing the train load that can be hauled by every locomotive in the service over each section of the track.

The general assumption is that the tractive power of a locomotive depends upon the weight upon the drivers, and from the operator's standpoint, no other element need be considered, for it is assumed that the motive power should be in such condition as to be able, in each case, to slip the drivers on the best condition of track, which is assumed to be dry sanded rail.

The tables have been extended to include the train loads for 10, 20, 30, 40 and 50 per cent light. A chart has been developed which can be used for determining the load that can be hauled by any locomotive anywhere on the system, and this chart will be developed for taking care of future additions to motive power.



Hubert Le Grand Cornelison, Richmond, Ky. Educated for college at Walter's Collegiate Institute, Richmond, Ky. **Mr. Cornelison has been appointed Instructor in Mechanical Engineering, Purdue University, LaFayette, Indiana.**

Charles Miller Roswell, Sparta, Ky. Educated for college at the Carrollton High School, Carrollton, Ky. **Mr. Roswell is employed by Jackson Electric & Hyrdaulic Manufacturing Company, Jackson, Kentucky.**

George Taylor Bogard, Golden Pond, Ky. Educated for college at the Academy of the State University of Kentucky. **Mr. Bogard is employed by the Western Electric Company, Chicago, Illinois.**

Thesis: "An Efficiency Test of the Richmond Electric and Power Co."

This plant is equipped with one Erie City 150 H. P. tubular boiler, carrying steam at 100 pounds pressure.

The motive power consists of one 150 H. P. Russell engine and one 75 H. P. Buckeye high speed engine, belted respectively to a 100 k. w. and a 50 k. w. inductor alternator.

The object of the test was to find the relative efficiencies of the various machines and the cost of power per kilowatt on the switch-board.

Arza Lytle Wilhoite, Daviess Co., Ky. Educated for College in the Daviess County Common Schools. **Mr. Wilhoite has been appointed Instructor in Steam Engineering Laboratory, State University, Lexington, Kentucky.**

Joseph Latham Pogue, Mayslick, Ky. Educated for college at Millersburg Military Institute, Millersburg, Ky. **Mr. Pogue is employed by the Tennessee Coal, Iron & Railway Company, Ensley, Alabama.**

Thesis: "The Determination of the Heating Value of Southern Coals."

The object of this thesis is to ascertain the number of British Thermal Units, evolved by the Parr calorimeter.

A series of tests was made on bituminous coals from twenty-nine different mines adjacent to the C. N. O. & T. P. Railroad in Kentucky and Tennessee, and values ranging from 12500 B. T. U. to 14500 B. T. U. were obtained.

Benjamin Warfield Bennett, Lexington, Ky. Educated for college by private instructor. **Mr. Bennett is employed by the American Blower Company, Detroit, Michigan.**

Thesis: "An Experimental Study of Alternating Current and Voltage Wave Forms."

This thesis consists of the design and construction of the apparatus necessary for determining alternating current and voltage wave forms.

The waves are determined by three methods: (1) The Voltmeter method, (2) The condenser and galvanometer method, (Jaubert), (3) The zero method (Mershon). The waves are to be investigated under different conditions of load, and finally a theoretical comparison of the waves under varying loads, as determined by the different methods is made.

The College of Mechanical *and* Electrical Engineering State Univeristy of Kentucky
Lexington

Offering a University Course in
Dynamic Engineering

A GROUP OF STUDENTS FROM
THE COLLEGE OF MECHANICAL AND ELECTRICAL ENGINEERING, STATE UNIVERSITY OF KENTUCKY
APRIL. 1908

Front View of Campus.

MECHANICAL AND ELECTRICAL ENGINEERING

FACULTY

AND ASSISTANTS

JAMES KENNEDY PATTERSON, Ph. D., L.L. D., F. S. A., *President*
Professor of History, Political Economy and Metaphysics

FREDERICK PAUL ANDERSON, M. E., *Director*
Professor of Mechanical Engineering

JAMES GARRARD WHITE, A. M.
Professor of Mathematics and Astronomy

ALEXANDER MASSEY WILSON, M. E
Professor of Electrical Engineering

LEON KAUFMAN FRANKEL, M. E.
Professor of Machine Design

MERRY LEWIS PENCE, M. S.
Professor of Physics

ALEXANDER ST. CLAIR MACKENZIE, M.A., F. R. S. L.
Professor of English and Logic

WALTER ELLSWORTH ROWE, C. E.
Professor of Civil Engineering

FRANKLIN ELLIOTT TUTTLE, A.M., Ph.D.
Professor of Chemistry

PHILIP WORTHINGTON CORBUSIER, First Lieut. U. S. A.
Commandant and Professor of Military Science and Tactics

W. WALTER H. MUSTAINE, B. S.
Director of Physical Culture

MISS ELIZABETH SHELBY KINKEAD
Lecturer on English Literature

JOSEPH MORTON DAVIS, A.B., B.S.
Assistant Professor of Mathematics

MISS MARTHA RIPPERDAN WHITE, M.S.
Assistant in Mathematics

JOSEPH DICKER
Instructor in Blacksmith Shop and Foundry

LOUIS EDWARD NOLLAU, M.E.
Assistant Professor of Drawing

LEO LOGAN LEWIS, B.M.E.
Instructor in Drawing and Shop Work

RALPH NELSON MAXSON, Ph. D.
Associate Professor of Chemistry

WILLIAM SNYDER WEBB, M.S.
Assistant Professor of Physics

CHARLES EDGAR SCHOENE, B.M.E.
Instructor in Electrical Laboratory.

AZRA LYTLE WILHOITE, B.M.E.
Instructor in Steam Laboratory

JOHN DICKER.
Instructor in Shop Work

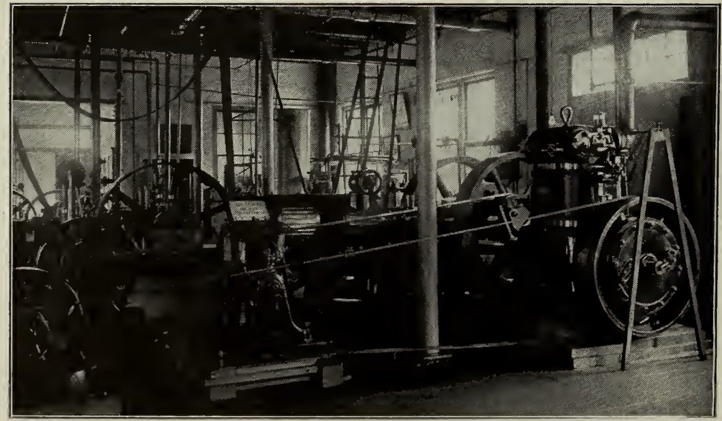
MRS. ANNA BERRY JONES.
Department Secretary

GORDON THURMAN,
Engineer and Assistant in Wood Shop

GEORGE McINTYRE HOWARD,
Assistant in Experimental Laboratory

Mechanical Hall—State University of Kentucky.

Office of the Director.



Steam and Electrical Laboratory.

A Practical Education

The Training of Mechanical and Electrical Engineers in Kentucky

The SUCCESSFUL man of today is one who has an education that has a market value. This applies to all classes of men. The writer, the lawyer, the surgeon, the merchant, or the engineer can measure his value to the world largely by what men are willing to pay for his services. The conception of an education has been greatly modified in recent years. A man is educated who is skilled in doing some useful thing; who manifests an interest in all men engaged in useful work; who is always striving to be more skillful and better informed in his own work. The beauties of art, literature and philosophy do not belong to any class of men. The man who is engaged in productive work should find first that culture that comes from doing his work well, but his happiness and breadth of life will be increased if he finds some of the gems in the world of literature and art.

The technical school is responsible to a large degree for the present status of the science of engineering. Machines today are built by men well versed in the refinements of mechanical engineering. The great industries of this country are continually looking for young men who have a scientific training in the art of machine designing and power transmission. The steam engine presents each year new possibilities, and the evolution in this direction has recently taken shape in the steam turbine. The gas engine is being more widely applied than ever before. The recent development of available water power, and the growth of the interurban railway lines have made new fields of endeavor for the highly trained mechanical engineer.

Kentucky has not been slow to recognize the fact that she must provide for her sons a great school in mechanical and electrical engineering, in order to equip them for a work that offers large opportunities in this age of industrial achievements. For fifteen years the State University of Kentucky has been sending her mechanical and electrical engineers to all parts of the country where they have achieved great distinction with the largest machine, engine and electrical apparatus building concerns. Kentucky boys have made such a record that there is a demand for State University of Kentucky mechanical and electrical engineers that can not be supplied. In the class of 1906 there were thirty men and there were over one hundred applications for these graduates There were eleven applicants for State University men to take up teaching work in mechanical and electrical engineering in some of the best known universities in this country. The class of 1907 all secured good positions and all of the thirty-three 1908 graduates, notwithstanding the business depression, have found employment in good engineering positions. No other state in the Union makes such liberal concessions to her young men to gain an education as does Kentucky. A county appointed student not only gets his tuition, matriculation fees and room rent free, but the legislature has actually provided that he receive his traveling expenses from his home to the college and return. The expenses for any resident of the state, whether he be appointed or not, are reduced to a minimum. Every young Kentuckian should recognize that the state has put at his command the means of obtaining an education in mechanical and electrical engineering that is second to none. He should further appreciate the fact that the state is making provisions that would cost each student at least two hundred dollars a year for tuition should all the expenses of his training be gotten in a school not supported by state or federal aid.

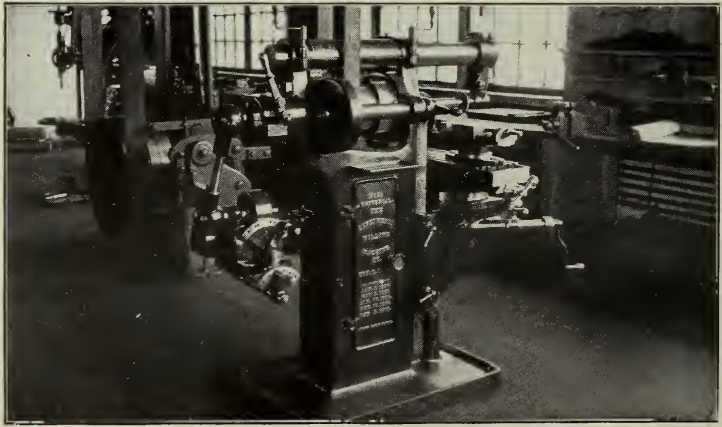
BUILDING AND EQUIPMENT

Mechanical Hall is the home of the College of Mechanical and Electrical Engineering. It contains 30,000 square feet of floor area and is admirably adapted for all recitation, lecture, drawing and laboratory work.

The equipment of the department is described briefly as follows: The drawing rooms contain drawing tables and boards to accommodate about one hundred students.

Looking Across the Front of Mechanical Hall.

A Corner in the Wood Shop.



A Corner in the Machine Shop.

Power is supplied to the shops by a 10-inch by 24-inch Hamilton-Corliss noncondensing engine.

The wood shop contains thirty benches, each with a complete set of bench tools: and twenty-two lathes, each with a complete set of wood-turning tools. Besides these there are a band saw, a jig saw, two circular saw tables, a trimmer and a grindstone.

The foundry contains a 30-inch cupola furnace, having a capacity of a ton of metal per hour, a brass furnace, twelve complete sets of moulder's tools, twelve benches, besides the ladles, flasks, clamps, core oven, pattern rack, and other equipment such as is used in practical foundry operation.

The blacksmith shop is equipped with fifteen down-draft forges. With each forge there is a set of blacksmith tools. A power hammer is available for heavy work.

The machine shop contains seven lathes, two milling machines, one planer, one shaper, two drilling machines, one dry emery grinder, one wet emery grinder, one universal grinding machine, two sensitive drills, twelve vises for bench work in metal an air compressor, some pneumatic tools, and a small punch and shear.

The tool room is equipped with a varied assortment of such tools and supplies as are used in the shops. In connection with the shops there is a wash-room containing lockers for the accommodation of the students.

There are two separate boiler-houses. One contains a 50-horse-power Babcock and Wilcox boiler and a No. 3 Dean pump. The boiler is used for heating and to supply steam to the Hamilton-Corliss engine which furnishes power to the shops. The other boiler house is situated close to the steam laboratory, and a 100-horse-power Babcock and Wilcox boiler has just been installed in it. This boiler can furnish steam at 200 pounds pressure, and an elaborate equipment for boiler testing has been installed, including induced draft apparatus, barrels and scales for weighing water, and devices for burning oil and gas, as well as coal.

The steam engineering laboratory is equipped with indicators, planimeters, gauges, pyrometers, reducing motion apparatus, scales, micrometers, tachometers, etc. It contains a 40-horse-power Houston, Stanwood and Gamble cross-compound throttling engine, a 10 horse-power Corliss engine, a 25-horse-power Buffalo Forge engine, a 35-horse-power Westinghouse single-acting compound engine, a small slide-valve engine for elementary experimental work in valve setting a small engine with Stephenson valve gear, and a 10 horse-power De Laval turbine. There are also two 4-horse-power Fairbanks-Morse gasoline engines with gas attachments, and the necessary auxiliary apparatus for testing.

For work in testing materials of construction there is a 100,000 pound Riehle testing machine, and a Fairbanks-Morse cement-testing equipment.

For the experimental engineering work in electrical engineering there are a 10 kw., d. c. Edison dynamo, a 9 kw., d. c. motor, a 2-horse-power General Electric induction motor, a 1.5 kw. polyphase dynamo, a Wagner induction motor, d. c. generator set furnishing 3 kw., a potentiometer, a photometer, and several galvanometers,. Wheatstone bridges, and other apparatus of the same general character.

There is quite an extensive equipment for pursuing the study of telephony, consisting of a small switchboard containing jacks and drops for both common battery and magneto circuits, built by the American Telephone Company. Then there is a number of subscribers' instruments, some of the American Telephone Company's make, and some of the Western Electric Company's. This equipment is sufficient to enable the students to obtain a comprehensive grasp of some of the advanced problems of telephony.

The aim of the College of Mechanical and Electrical Engineering, as a part of the State University, will be primarily to train young men to be competent to take up the work usually assigned to graduates of engineering schools, either in mechanical or electrical engineering. In addition to this, as opportunity offers, it is expected to pursue advanced scientific research pertaining to all the branches of mechanical, electrical, and chemical engineering.

A Corner in the Foundry.

A Corner in the Senior Reading Room.

COURSE OF STUDY.

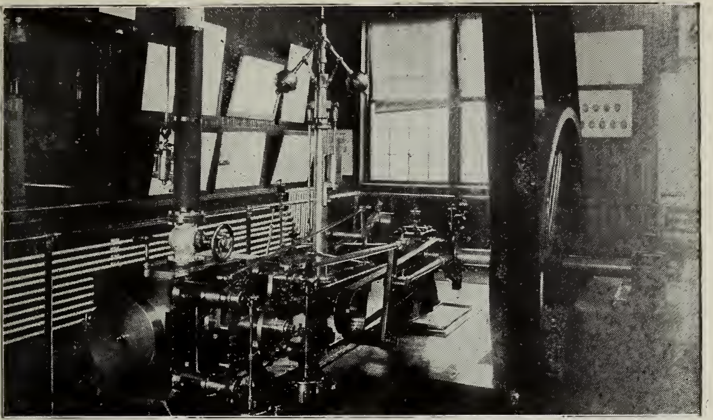
The practical work extends over a period of two years, and includes the experience in the wood shop, machine shop, foundry, and forge shop. During this period the class-room work and drawing are preparatory to the theoretical studies taken up during the third and fourth years. The course in Mechanical Engineering, as administered at the State University of Kentucky, may be considered as being divided into three parts, as follows:

1. *Mechanical Engineering Proper.* Under this heading come the studies of steam engineering practice, the operation and design of gas engines and producers, and the operation and design of manufacturing machinery.

2. *Chemical Engineering.* This is intended especially for those who will go into the making of iron and steel, and involves study of the various methods of analysis of iron, steel, coals, fluxes, and refractory substances.

3. *Electrical Engineering.* This involves the study of the design and operation of electrical apparatus and machinery.

Of course, the foregoing is a general classification. Each of the subjects mentioned permits of further subdivision to suit the needs of the student.



Corliss Engine Driving Shops.

Machine Shop Annex.

Corner of Chemical Laboratory.

Corner of Physical Laboratory.

DEGREES.

The course of study in Mechanical and Electrical Engineering all lead to the degree or B. M. E. (Bachelor of Mechanical Engineering). The advanced degree, M. E. (Mechanical Engineer), may be obtained by a resident student in one year after taking the degree B. M. E. from the State University of Kentucky, or any institution of equal requirements, provided he has done the work assigned him satisfactorily, passed his examination, and presented an acceptable thesis.

A non-resident student may obtain the degree of M. E. three years after graduation, if he has been engaged in practical engineering work during that time, passes an examination, and presents an accceptable thesis. At least two years' notice must be given to the Faculty that post-graduate work is to be done, and the work must be approved by the Faculty.

FRESHMAN YEAR.

1. *Technical Instruction.* Thirty-five weeks, one hour per week. (a) Recitation on the forms of wood-working tools and the cutting and peculiarities of timber. (b) Lectures on the operation of the various forms of wood-working machinery. (c) Lectures on pattern-making, molding and casting.

2. *Mechanical and Free-hand Drawing.* Thirty-five weeks, seven and a half hours per week. (a) This drawing includes free-hand sketches, drawing from copies and models, using parts of machines in the Mechanical Laboratories as models. (b) Free-hand lettering. (c) Exercises in tinting and shading. (d) Tracing. (e) Blue-printing.

3. *Shop-work.* Thirty-five weeks, eleven and a half hours per week. (a) Bench-work in wood, including exercises in the following operations: planing, sawing, rabbeting, plowing, notching, splicing, mortising, tenoning, dovetailing, framing, paneling and the general use of carpenters' tools. (b) Wood-turning, involving the various principles of lathe-work in wood. (c) Pattern-making, which gives the student experience in the construction of patterns for foundry work. (d) Foundry work, including the various operations of molding, core-making and the melting of iron and brass.

4. *English.* Thirty-five weeks, three hours per week.

5. *Higher Algebra.* Twenty weeks, five hours per week.

6. *Trigonometry.* Fifteen weeks, five hours per week.

7. *Physics.* Fifteen weeks, two hours per week; twenty weeks, three hours per week.

8. *Chemistry.* Fifteen weeks, three hours per week; twenty weeks, two hours per week.

SOPHOMORE YEAR.

1. *Mechanical Drawing.* Fifteen weeks, eight hours per week. (a) Drawing the parts of machines and complete machines to scale. (b) Isometric aad Descriptive Geometry problems. (c) Design of machine details.

2. *Shop-work.* Thirty-one weeks, ten hours per week. (a) Exercises in iron and steel forging. (b) Exercises in vise-work in metal. (c) General machine work; including screw cutting, drilling, planing, and the milling of iron, brass, and steel.

3. *Shop Practice.* Fifteen weeks, two hours per week.

4. *Descriptive Geometry.* Twenty weeks, eight hours per week.

5. *Physical Laboratory.* Fifteen weeks, five hours per week.

6. *Advanced Physics.* Fifteen weeks, three hours per week.

7. *Analytical Geometry.* Thirty-five weeks, five hours per week.

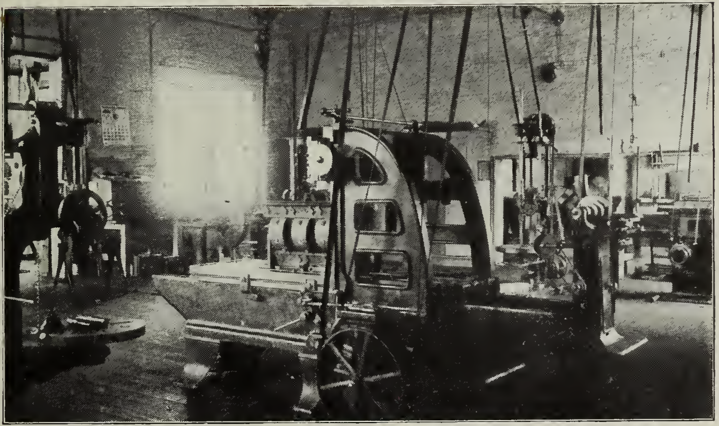
8. *Surveying.* Twenty weeks, two hours per week.

9. *Calculus.* Twenty weeks, five hours per week.

10. *Electricity and Magnetism.* Twenty weeks, three hours per week.

11. *Field Work in Surveying.* Four weeks, ten hours per week.

A Corner in the Forge Shop.



Machine Shop.

JUNIOR YEAR.

1. *Kinematics.* Fifteen weeks, five hours per week. Under this head are studied the velocity ratios in various motions, construction of gears, cams, quick-return motions, and the manner of designing trains of mechanism.

2. *Mechanical Drawing.* Fifteen weeks, nine hours per week; ten weeks, ten hours per week and ten weeks, eight hours per week. The work consists of Kinematic Drawing, including spur, bevel, worm and spiral gearing: Design of Shop Machines, such as lathes, planers, shapers, drills, etc., including an original design by each student of some shop machine complete, with all detail drawings.

3. *Analytical Mechanics.* Twenty weeks, five hours per week.

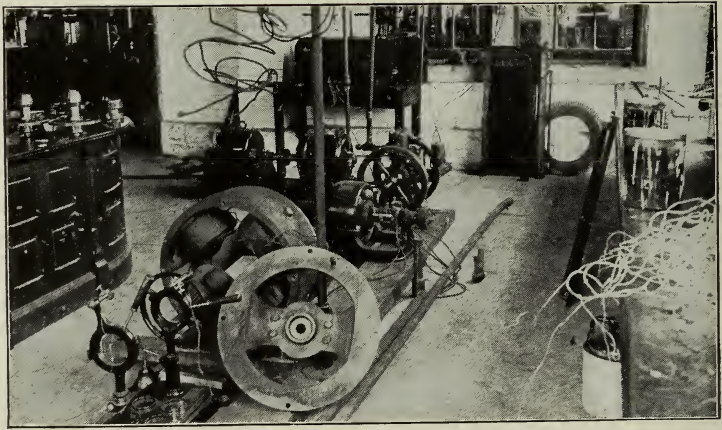
4. *Strength of Materials.* Fifteen weeks, five hours per week.

5. *Elements of Electrical Engineering.* Fifteen weeks, five hours per week.

6. *Graphic Statics.* Ten weeks, five hours per week.

7. *Calculus.* Fifteen weeks, five hours per week.

Switchboard, Electrical Laboratory.



Electrical Laboratory

8 *Electrodynamic Machinery.* Ten weeks, five hours per week.

9. *Theory of Machine Design.* Five weeks, five hours per week.

10. *Dynamo and Motor Design.* Ten weeks, five hours per week.

11. *Electrical Design.* Ten weeks, five hours per week, and five weeks, five hours per week.

12. *Electrical Laboratory.* Ten weeks, two hours per week.

13. *Chemistry and Gas Analysis.* Ten weeks, five hours per week.

14. *Flue Gas Analysis.* Ten weeks, three hours per week.

15. *Chemical Laboratory.* Fifteen weeks, four hours per week.

16. *Testing of Materials Laboratory.* Fifteen weeks, one hour per week.

SENIOR YEAR.

1. *Thermodynamics.* Fifteen weeks, three hours per week. This work consists of a study of the laws of thermodynamics, thermal capacities, and the application of thermodynamics to the steam engine, steam turbine, and gas engine.

2. *Steam Boilers.* Fifteen weeks, two hours per week. A study of the various commercial steam boilers, consumption of fuel, incrustations, determining the horse power of boilers, boiler tests, the design of boilers for efficiency and economy, and the methods of heat transmission.

3. *Valve Gearing.* Fifteen weeks, three hours per week. The study of various forms of standard engine valves and methods of designing.

4. *Hydraulics.* Fifteen weeks, two hours per week.

5. *Alternating Currents; Dynamo and Motor Design.* Fifteen weeks, five hours per week.

6. *Electrical Laboratory.* Twenty-five weeks, three hours per week.

7. *Alternating Currents and Power Plants.* Ten weeks, five hours per week.

8. *Logic.* Thirty-five weeks, two hours per week.

9. *History.* Thirty-five weeks, three hours per week.

10. *Dynamometers and Measurement of Power.* Ten weeks, two hours per week.

11. *Steam Turbines.* Ten weeks, three hours per week.

12. *Valve Gear Design.* Ten weeks, eight hours per week, and five weeks, five hours per week. This consists in working out valve gear problems.

13. *Engine and Machine Designing.* Fifteen weeks, five hours per week. A study of the modern methods of designing engines, boilers and machines.

14. *Experimental Engineering.* Twenty-five weeks, six hours per week. This includes a study of the steam engine indicator, making engine, boiler, and materials for construction tests, and experimental engineering work in electrical engineering.

15. *Theory and Practice of Photography.* Ten weeks, five hours per week.

16. *Electrical Design.* Twenty five weeks, three hours per week This consists of drawing-room work, Saturday mornings.

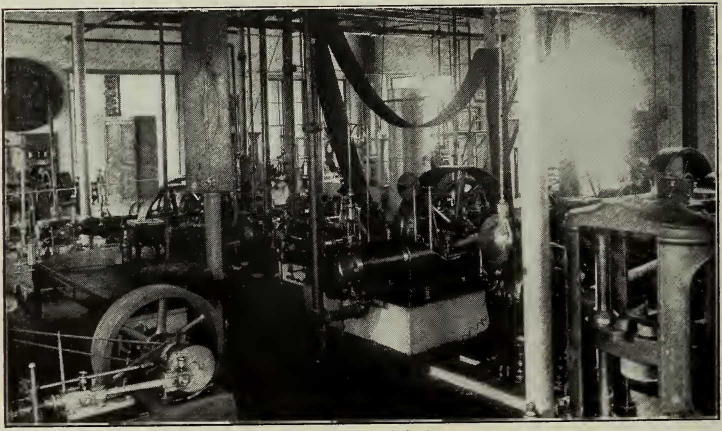
17. *Thesis Work.* Ten weeks, fifteen hours per week. Every student, before he attains the degree of B. M. E., must present a satisfactory thesis on some new design of a machine or an original investigation. The greater part of the second and third terms of the senior year is given to the preparation of this thesis. The subjects for these are assigned to students by the Dean of the Mechanical and Electrical Engineering Faculty, and the completed theses are kept on file with the college records, that they may serve as a reference for future investigators.

JUNIOR AND SENIOR INSPECTION TRIPS.

Annual trips, for the purpose of inspecting manufacturing and power plants are taken by the Junior and Senior Classes. The Juniors, for several years, have visited Cincinnati, Hamilton and Dayton. During the last five years the Seniors have visited Chicago and its vicinity on the annual trip.

During the Spring term, four days are set apart for the Junior trip and six for the Senior. The experiences of these trips are considered to be among the most valuable of the engineer's collegiate life.

Junior Drawing Room.



Steam and Electrical Laboratory.

Schedule of Studies for the Degree Bachelor of Mechanical Engineering

YEAR.	FIRST HOUR. 8-9 AM	SECOND HOUR. 9-10 AM	THIRD HOUR. 10:30-11:30 AM	FOURTH HOUR. 11:30-12:30 AM	1:30-3:30 PM	3:30—4:30 PM	SATURDAY 9-12 AM	TERM
FRESHMAN	English 3 Drawing 2	Trigonometry 5	Physics 2 Drawing 3	Chemistry 3 Drawing 2	Wood Shop Bench Lathe	Drill Gym. 4:30-5:30	Wood Shop Drawing	I
	English 3 Drawing 2	Higher Algebra 5	Physics 3 Drawing 2	Chemistry 2 Drawing 3	Pattern Mak. & Foundry	Drill Gym. 4:30-5:30	Pattern Mak. & Drawing	II
	English 3 Drawing 2	Higher Algebra 5	Physics 3 Drawing 3	Chemistry 2 Drawing 3	Pattern Mak. & Foundry	Drill Gym. 4:30-5:30	Pattern Mak. & Drawing	III
SOPHOMORE	Analytical Geometry 5	Adv. Physics 3 Shop Practice 2	Elementary Design 5	Physical Lab. 5	Iron & Steel Forging	Drill Gym. 4:30-5:30	Elementary Design	I
	Analytical Geometry 5	Elec. & Mag. 3 Surveying 2	Calculus 5	Desc. Geom. 5	Machine Shop Work	Drill Gym. 4:30-5:30	Descriptive Geom. Draw.	II
	Analytical Geometry 5	Elec. & Mag. 3 Surveying 2	Calculus 5	Desc. Geom. 5	Machine Shop Work & Surveying	Drill Gym. 4:30-5:30	Descriptive Geom. Draw.	III
JUNIOR	Elementary Electricity 5	Mechanics of Materials 5	Calculus 5	Kinematics 5	Kinem. Draw. Chemical Lab.	Drill	Testing of Materials	I
	Analytic Mechanics 5	Electrical Design 5	Chem. & Gas. Analysis 5	Mach. & Elec. Design 5	Machine Des.	Drill	Flue Gas Analysis	II
	Graphical Statics 5	Dyn. & Mot. Design 5	Analytical Mechanics 5	Dyn. Ele. Machinery 5	Machine Des. Elec. Lab.	Drill	Electrical Design	III
SENIOR	Thermodyn. 3 Hydraulics 2	History 3 Logic 2	Altern. Curr. & Dyn. Mot. Design.	Valve Gears 3 Steam Boil. 2	Valve Des. & Elec. Lab.	Library	Electrical Design	I
	Altern. Curr. & Power Plants 5	History 3 Logic 2	Steam Eng. & Pump Design	Dynamometers 2 Steam Turbi. 3	Valve & Dyn. & Mot. Des.	Library	Electrical Design	II
	Thesis 5	History 3 Logic 2	Photography 5	Thesis 5	Thesis.	Library	Thesis	III

Numbers give hours recitation per week. *2's Recite on Tuesdays and Thursdays.* *3's on Mondays, Wednesdays and Fridays*

SOME VIEWS ON THE CAMPUS.

The campus, sufficiently rolling to make it picturesque and consisting of fity-two acres, is laid out in drives, walks, and lawns, and is planted with a choice variety of trees and shrubs.

North Entrance.

Carnegie Library, (under construction).

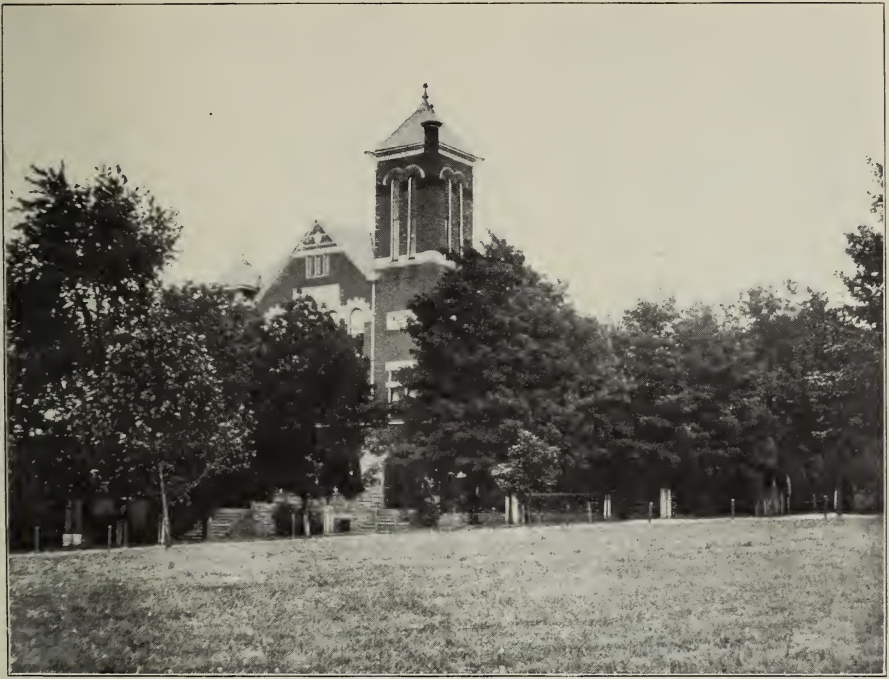
Main Building.

Officers of the Battalion—1908.

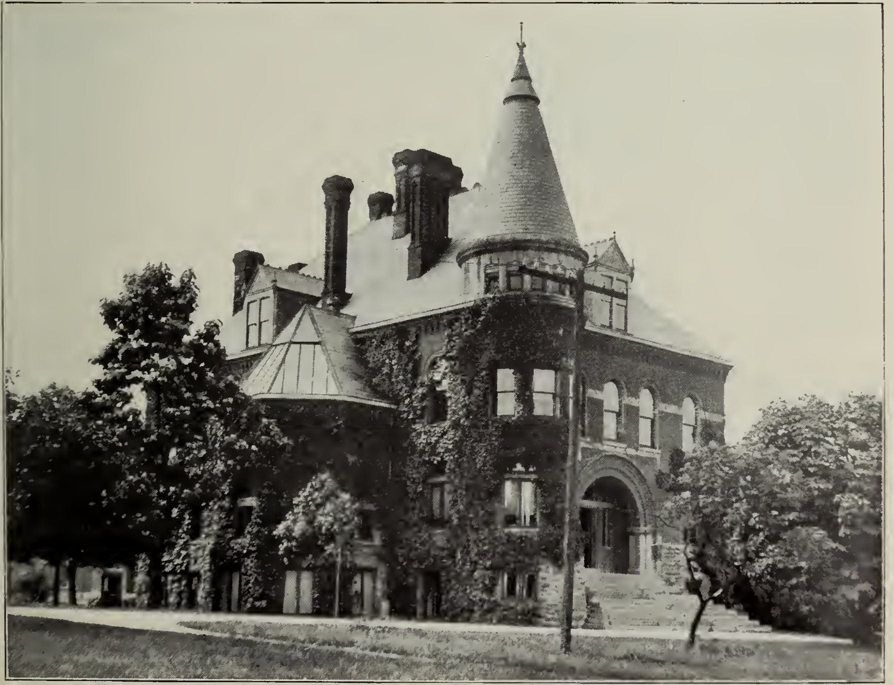
THE MILITARY DEPARTMENT.

In the establishment of the Land Grant Colleges, Congress required that all male students should be given military instruction and the War Department furnishes a full supply of arms and ammunition for the use of the cadets in this course. An army officer has charge of this department and in addition to the knowledge of military affairs the student acquires dignity of carriage, gentlemanly deportment, habits of order, neatness, and punctuailty.

Battallion—1908.



Gymnasium.



Chemistry Building.

ENTRANCE REQUIREMENTS.

An applicant for admission to the Freshmen Class in any department of the University must present fifteen units as follows: English 3, Algebra 1-½, Plane and Solid Geometry 1-½, One Ancient or Modern Language 2, General or English History 1, Physics 1, and five additional units must be selected from the following list: Ancient or Modern Languages 3, Chemistry 1, Physical Geography ½, Geology ½, Astronomy ½, Physiology ½, Botany ½, Zoology ½, Civics ½, American History ½, Plane Trigonometry ½, Manual Training ½, and Drawing ½. A unit involves the pursuit of a subject for five hours a week for one school year of not less than thirty-four weeks. If the applicant can offer only 13 units he may be admitted, but these conditions must be removed before he can enter the Sophomore Class. Those who are prepared to pass a satisfactory examination in Spelling, Grammar, Arithmetic, Geography, and United States History may enter the Academy and if they are of sufficient age and maturity they may be admitted to any of the special courses.

EXPENSES.

The necessary expenses of the appointees are about as follows:

Washing	$20 00
Uniform	16 00
Books	25 00
Use of Furniture	2 50

Board—from $2.00 to $3.50 (per week).

The additional expenses for those who are not appointees are about as follows:

Tuition in the Engineering Schools	$40 00
Tuition in College of Arts and Sciences	30 00
Tuition in College of Agriculture	25 00
Tuition in the Academy	20 00
Matriculation Fee	5 00
Gymnasium Fee	5 00
Laboratory Fee, each	5 00
Room-rent	45 00

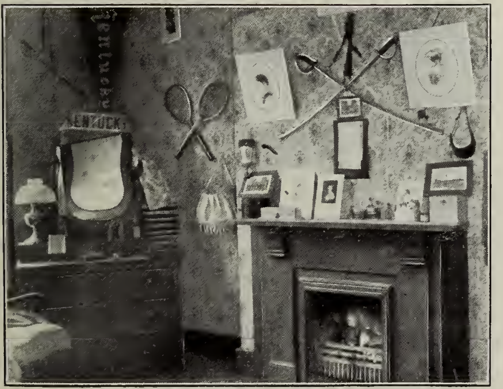
Beginning with September, 1908, a deposit fee of $10.00 will be required of all students. This takes the place of the various laboratory and other deposit fees heretofore charged and is returnable at the close of the year, less any damage assessment that may be charged up against it.

For Catalogue or other information, address, F. PAUL ANDERSON, *Director*,
Lexington, Ky.

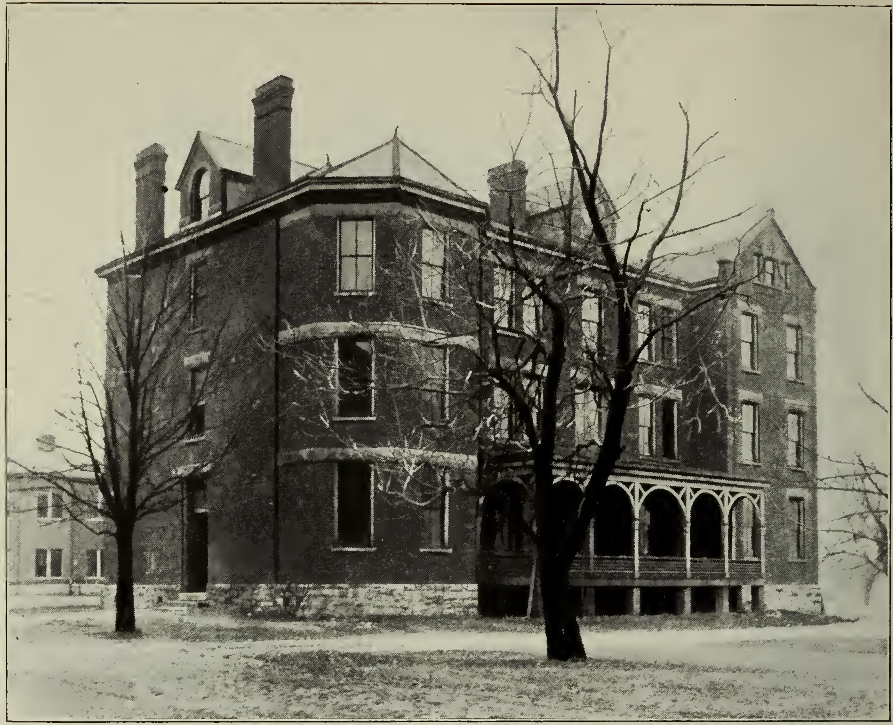
Base Ball Team—1908.

Foot Ball Team—1907.

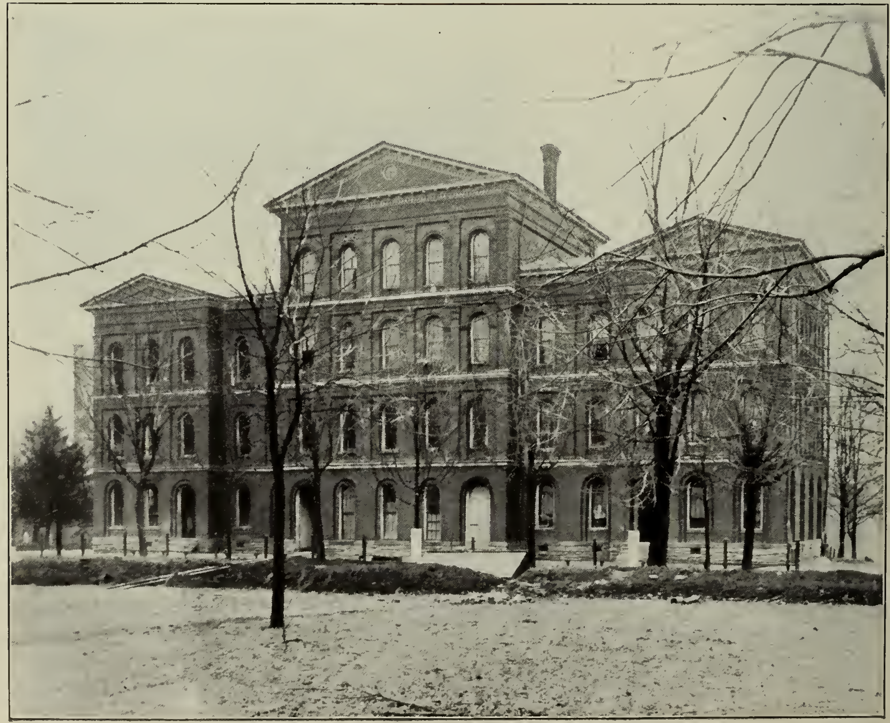
"I have but one counsel for you—
be master."—*Napoleon*



View of Students Room.



Boy's Old Dormitory.



Boy's New Dormitory.

3 0112 105655481

Mechanical Engineering

A
Training
For
A
Useful
Life

Electrical Engineering